TRUSTED SERVICE COMPOSITION FOR DISTRIBUTED REAL-TIME AND EMBEDDED SYSTEMS

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Distributed real-time and embedded (DRE) software systems are expected to provide high quality-of-service (QoS) attributes, *e.g.*, scalability, reliability, and security, in conjunction with correct functionality built atop of infrastructure with limited capabilities. Given the many complex and conflicting QoS and functional attributes of DRE systems, a major challenge in developing such software systems is to guaranteeing it trustworthiness, *i.e.*, the degree of confidence that the system adheres to its specification. Current state-of-the-art methods use service orientation to compose systems from reusable and trusted services, and validate the trustworthiness of the end system using runtime evidences. The major shortcoming of this approach is that trust is considered an afterthought (*i.e.*, not an integral part of the software development lifecycle).

Trustworthiness of a system should be evaluated based on the trustworthiness of different properties of the system, including its functionality and QoS attributes. Our research extends current state-of-the-art methods for developing trusted DRE systems by considering development time factors of the composition (*e.g.*, properties of individual services, interaction patterns, and compatibility with other services). It is a major research challenge to evaluate the composition of trustworthiness for different system properties with different composition patterns. Our current and future research work to address this challenge includes identifying trust composition operators for different types of compositions, deriving a formal model of trust composition, and validating our approach with a case study using a distributed tracking system.